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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09 826,674	04.05.2001	Saket Chadda	34759.9800	3534

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EXAMINER

DEO, DUY VU NGUYEN

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 03/25/2003

10

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/826.674

Applicant(s)

CHADDA ET AL.

Examiner

DuyVu n Deo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 February 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) See Continuation Sheet is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 6-10, 14-16, 21-24, 27-29, 31-36, 52-54, 56-61, 65-67, 72-78, 82-87, 91-93, 98-102 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 03 February 2003 is: a) ☒ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other

: Continuation of Disposition of Claims: Claims pending in the application are 1-3,6-10,14-16,21-24,27-29,31-36,52-54,56-61,65-67,72-78,82-87,91-93 and 98-102.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 2, 14, 21, 24, 27, 28, 52, 53, 65, 75, 78, 79, 91 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo et al. (JP 11-135466), Beardsley et al. (US 6,135,865), and Vanell et al. (US 5,945,346).

US patent 6,117,775 is considered as the correct translation of JP patent 11-135466 and is used here for the rejection. A translation will be provided upon applicant's request.

Kondo teaches a polishing method for removing a metal surface wherein the metal surface is oxidized to form a thin removable oxide film (claimed kinetic removal mechanism for removal of the metal surface is characterized by a formation step for formation of a removable surface film) comprising: causing a wafer to contact a polishing pad and rotating the wafer and the pad (claimed abrasive step or causing work piece to contact a polishing member while effecting relative motion between them), supplying a slurry having less than 1 wt% of polishing abrasive between the wafer and the pad (col. 6, line 5-16, line 57-68; col. 11, line 60-col. 12, line 3).

Unlike claimed invention, Kondo doesn't describe supplying slurry through a plurality of pores in the pad and through at least one pore in the platen connected to the pad. Beardsley

teaches a CMP apparatus wherein he teaches supplying the slurry through a porous pad and through holes formed in the platen connected to the pad (claimed at least one pore formed in the platen) (col. 3, line 55-63; col. 5, line 50-68; figure 4, 5). it would have been obvious for one skilled in the art to modify Kondo's method in light of Beardsley's slurry distributing system because Beardsley teaches that this slurry distributing system is inexpensive and uncomplicated and would distributing slurry more uniformly on the pad to have an uniform polishing action (col. 1, line 54-col. 2, line 13).

Unlike claimed invention, applied prior art doesn't describe establishing the T at the contact area by heating circulating a heated fluid through the heat conductive platen or by heating or cooling the slurry before distributing it to the contact area. Vanell teaches that the chemical reactions are sensitive to the T and the reaction rate typically increases with the T. in the CMP, the T is held within a certain range to control the rate of reaction. he teaches of circulating fluid to heat or cool the platen to control the rate of reaction of the polishing process and also to heat the platen to ensure the chemicals in the slurry have minimum reaction rate when starting a CMP process (col. 9, line 35-col. 10, line 10). it would have been obvious at the time of the invention for one skilled in the art in light of Vanell's teaching of controlling the T of the process to heat or cool the platen and also the slurry in order control the rate of the reaction or to heat the slurry before distributing it to the contact area to ensure the chemicals in the slurry to have a minimum reaction when starting a CMP process.

Referring to claim 24, the friction between the wafer and the polishing member (claimed contact area) while rotating would establish a T at the contact area while polishing or distributing the slurry.

Referring to claims 52 and 78, Kondo discloses the metal to be polished is Cu (col. 6, line 19) and down force is 220 g/cm² or 3.13 psi (claimed low-down force pressure). The rate of removal of Cu surface would have to be approximately proportional to the contact pressure since a higher P would increase polishing rate and a lower P would slow down polishing rate.

3. Claims 1-3, 5, 14, 21, 24, 27-29, 31, 52-54, 56, 65, 75, 78-80, 82, 91 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo et al. (JP 11-135466), Sato (US 5,246,525), and Vanell et al. (US 5,945,346).

US patent 6,117,775 is considered as the correct translation of JP patent 11-135466 and is used here for the rejection. A translation will be provided upon applicant's request.

Kondo teaches a polishing method for removing a metal surface wherein the metal surface is oxidized to form a thin removable oxide film (claimed kinetic removal mechanism for removal of the metal surface is characterized by a formation step for formation of a removable surface film) comprising: causing a wafer to contact a polishing pad and rotating the wafer and the pad (claimed abrasive step or causing work piece to contact a polishing member while effecting relative motion between them), supplying a slurry having less than 1 wt% of polishing abrasive between the wafer and the pad (col. 6, line 5-16, line 57-68; col. 11, line 60-col. 12, line 3).

Unlike claimed invention, Kondo doesn't describe supplying slurry through channel or pores formed in the pad and through at least one pore, which formed in a platen and collinear with the channel. Sato describes a polishing apparatus wherein he teaches supplying the slurry through channel 4 formed in the pad and pore 4, formed in the platen and collinear with the

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channel 4 (figure 1b, 2b, 3b). it would have been obvious to modify Kondo's method in light of Sato's slurry distributing system because Sato shows that slurry can be distributed uniformly on the pad and therefore, would help the polishing of the wafer is more uniform to provide a flat surface (col. 2, line 50-65: summery).

Unlike claimed invention, applied prior art doesn't describe establishing the T at the contact area by heating circulating a heated fluid through the heat conductive platen or by heating or cooling the slurry before distributing it to the contact area. Vanell teaches that the chemical reactions are sensitive to the T and the reaction rate typically increases with the T. in the CMP, the T is held within a certain range to control the rate of reaction. he teaches of circulating fluid to heat or cool the platen to control the rate of reaction of the polishing process and also to heat the platen to ensure the chemicals in the slurry have minimum reaction rate when starting a CMP process (col. 9, line 35-col. 10, line 10). it would have been obvious at the time of the invention for one skilled in the art in light of Vanell's teaching of controlling the T of the process to heat or cool the platen and also the slurry in order control the rate of the reaction or to heat the slurry before distributing it to the contact area to ensure the chemicals in the slurry to have a minimum reaction when starting a CMP process.

Referring to claim 24, the friction between the wafer and the polishing member (claimed contact area) while rotating would establish a T at the contact area while polishing or distributing the slurry.

Referring to claims 52 and 78, the metal to be polished is Cu (col. 6, line 19) and down force is 220 g/cm² or 3.13 psi (claimed low-down force pressure). The rate of removal of Cu

surface would have to be approximately proportional to the contact pressure since a higher P would increase polishing rate and a lower P would slow down polishing rate.

4. Claims 6-10, 15, 16, 32-36, 57-61, 66, 67, 83-87, 92, 93 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo/Bearsley/Vanell or Kondo/Sato/Vanell as applied to claims 1, 2, 3, 28, 29, 52, 53, 54, 78, 79, 80 above, and further in view of Berman et al. (US 5,882,251).

Referring to claims 6-10, 15, 16, 32-36, 57-61, 66, 67, 83-87, 92, 93 using polishing pad having grooves are well known to one skilled in the art as a way for slurry distribution and improved pad-wafer contact as shown here by Berman (col. 1, line 33-col. 2, line 20). the grooves intersect the channel on the pad (col. 2, line 5-10). the first grooves are perpendicular to the second grooves (fig. 2).

5. Claims 22, 23, 72-74, 76, 77, 98-102 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo/Bearsley/Vanell or Kondo/Sato/Vanell as applied to claims 21, 52, 72, 78 above, and further in view of admitted prior art.

Unlike claimed invention, Kondo doesn't describe the pressure is from about 0.10-3 or from 0.10-1 psi. he teaches a pressure of 220 g/cm² or 3.129 psi and he teaches that the down force is not limited to this (col.12, line 1-3). Furthermore using a pressure such as claimed 0.10-1 psi is well known and practiced by one skilled in the art as shown by the admitted prior art in page 5 in order to avoid disadvantage such as edge effects. Therefore, it would have been

obvious to one skilled in the art at the time of the invention use low P such as 0.1-1 psi in order to avoid defects such as edge effects and scratch on the wafer.

Referring to claims 72-74, 98-100, admitted prior art shows that forming structure having less than 0.18 um and using lower dielectric constant material for isolation of these structures are desired to increase performance speed. Therefore, it would be obvious for one skilled in the art to apply Kondo's method to form structure having small size such as less than 0.18 um dimensions to produce a faster device.

Response to Arguments

6. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., Beardsley doesn't describe a platen having through holes formed therethrough which connected to a porous pad) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Furthermore, as shown in figures 4 and 5 of Beardsley shows holes and slurry is supplied to the pad surface through the platen. Therefore, there must be a holes formed therethrough the platen or otherwise slurry can not be supplied to the polishing member surface.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Referring to applicant's argument that Vanell doesn't teach establishing a T at a contact area by heating and cooling the polishing solution before distributing the polishing solution to the contact area. Please see col. 10, lines 5-8 in Vanell where he teaches that slurry should be at a predetermined T to ensure chemical in the slurry have a minimum reaction rate when starting a CMP process. This would suggest to establish the slurry at a certain T before supplying it to the contact area for polishing process to take place. Applicant's argument that it is not obvious to cool to heat the slurry before distributing it to the contact area because cooling or heating of the slurry before distribution can affect reactions within the slurry is found not persuasive because as shown by Vanell, the slurry T has to be established before any CMP process can take place. Therefore, it is necessary to cool or heat the slurry to a predetermined T in order to provide minimum reaction rate for the slurry.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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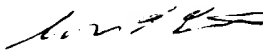
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however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n Deo whose telephone number is 703-305-0515.

DVD

March 20, 2003


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